

THAT CLAIMED IS:

1. An automated meter reading network system comprising:

a plurality of utility meters each one positioned remote from the other ones of the plurality of utility meters;

a plurality of sensors interfaced with each of the plurality of meters so that at least one of the plurality of sensors interfaces with and is positioned adjacent at least one of the plurality of meters to thereby sense utility usage data from each of the plurality of meters;

a communication network;

a plurality of meter data collectors positioned to collect utility usage data from each of the plurality of sensors so that at least one of the plurality of meter data collectors is positioned adjacent at least one of the plurality of utility meters and in communication with at least one of the plurality of sensors which interfaces with the at least one of the plurality of utility meters, the plurality of meter data collectors also being adapted to be positioned in communication with each other through the communication network so that each of the plurality of meter data collectors defines a communication node in the communication network and the plurality of meter data collectors defines a plurality of communication nodes in the network; and

a host computer positioned remote from the plurality of meter data collectors at a utility central station and in communication with each of the plurality of communication nodes in the communication network so that each one of the plurality of communication nodes are adapted to communicate with other ones of the plurality of communication nodes in the communication network to thereby reduce line-of-site communication problems between each of the plurality of communication nodes and the host computer.

2. A system as defined in Claim 1, wherein each of the plurality of meter data collectors includes a collector transceiver positioned to transmit data to the host computer and to other ones of the plurality of meter data collectors through the communication network and to receive data from the computer and from the other ones of the plurality of meter data collectors through the communication network and a collector controller positioned to control collecting of utility usage data and the transmitting and receiving of data to and from the collector transceiver.

3. A system as defined in Claim 2, wherein the host computer includes a host transceiver positioned to transmit data to and receive data from each of the plurality of communication nodes and a host controller positioned to control collecting of utility usage data from each of the plurality of communication nodes, transmitting data to each of the plurality of communication nodes through the host transceiver, and receiving data from each of the plurality of communication nodes through the host transceiver.

4. A system as defined in Claim 3, wherein each collector controller of the plurality of meter data collectors and the host controller include controller software associated with the controller and having a network data communication protocol, wherein the network data communication protocol includes a preselected application layer, and wherein the communication network comprises a radio frequency communication network.

5. A system as defined in Claim 4, wherein the radio frequency communication network has a frequency in the range of 850-1000 mega-hertz, wherein the frequency continuously changes between a plurality of different preselected frequencies to thereby define frequency hopping, wherein the controller software of the host controller initiates polling of the plurality of communication nodes through the frequency hopping within the communications network, and wherein each of the plurality of communication nodes responds to the polling by the host computer through the frequency hopping within the communications network.

6. A system as defined in Claim 5, wherein the network software includes an autosequencer to initiate polling of the plurality of communication nodes whereby each of the plurality of communication nodes is individually attempted to be polled by the host computer to determine a strength of communication signal between the host computer and each of the plurality of communication nodes, wherein each of the plurality of communication nodes also attempt to communicate with each other responsive to the autosequencer to determine a strength of communication signal between one of the plurality of communications nodes and another one of the plurality of communication nodes, and wherein the autosequencer further determines a communication sequence to each of the plurality of communication nodes responsive to the strength of communication signal between the host computer and each of the plurality of communication nodes and responsive to the strength of communication signal between each of

the plurality of communication nodes to define a preferred communication sequence path to each of the plurality of communication nodes from the host computer.

7. A system as defined in Claim 6, wherein the autosequencer updates the preferred communication sequence path to allow the preferred communication sequence path to vary over time.

8. A system as defined in Claim 7, wherein the plurality of meter data collectors include a first meter data collector, a second meter data collector in communication with the first meter data collector, and a third meter data collector in communication with at least one of the first and second meter data collectors, wherein the first meter data collector is positioned remote from the host computer to thereby have a greater signal strength than the second meter data collector and the third meter data collector, wherein the second meter data collector is positioned remote from host computer to thereby have a greater signal strength than the third meter data collector, and wherein the network software further includes a raking router to collect meter usage data from the first meter data collector responsive to polling received from the host computer and to rakingly collect data from each of the second and third meter data collectors responsive to the polling so that meter usage data is collected from each of the first, second, and third meter data collectors responsive to polling the first meter data collector and routed to the host computer.

9. A system as defined in Claim 7, wherein at least one of the plurality of meter data collector is positioned within at least one of the following: the same housing as at least one of the plurality of utility meters, a separate housing positioned closely adjacent at least one of the plurality of utility meters, and a separate housing positioned closely adjacent a subset of the plurality of utility meters.

10. A system as defined in Claim 7, wherein the host computer further includes memory having a meter data collector database associated therewith to thereby store meter collector data associated with each of the plurality of meter data collectors, the meter collector data including collector identification, collector physical address, and strength of signal between CIDs.

11. An automated meter reading network system comprising:

a plurality of sensors adapted to be interfaced with each of a plurality of utility meters each positioned remote from another one of the plurality of utility meters so that at least one of the plurality of sensors interfaces with and is positioned adjacent at least one of the plurality of meters to thereby sense utility usage data from each of the plurality of meters;

a plurality of meter data collectors positioned to collect utility usage data from each of the plurality of sensors so that at least one of the plurality of meter data collectors is positioned in communication with at least one of the plurality of sensors, the plurality of meter data collectors also being adapted to be positioned in communication with each other through the communication network so that each of the plurality of meter data collectors defines one of a plurality of communication nodes in a communication network; and

a host computer positioned remote from the plurality of meter data collectors and in communication with each of the plurality of communication nodes so that each one of the plurality of communication nodes are adapted to communicate with other ones of the plurality of communication nodes.

12. A system as defined in Claim 11, wherein each of the plurality of meter data collectors includes a collector transceiver positioned to transmit data to the host computer and to other ones of the plurality of meter data collectors and to receive data from the computer and from the other ones of the plurality of meter data collectors and a collector controller positioned to control collecting of utility usage data and the transmitting and receiving of data to and from the collector transceiver.

13. A system as defined in Claim 12, wherein the host computer includes a host transceiver positioned to transmit data to and receive data from each of the plurality of communication nodes and a host controller positioned to control collecting of utility usage data from each of the plurality of communication nodes, transmitting data to each of the plurality of communication nodes through the host transceiver, and receiving data from each of the plurality of communication nodes through the host transceiver.

14. A system as defined in Claim 13, wherein each collector controller of the plurality of meter data collectors and the host controller include controller software associated with the

controller and having a network data communication protocol, wherein the network data communication protocol includes a preselected application layer, and wherein the communication network comprises a radio frequency communication network.

15. A system as defined in Claim 14, wherein the radio frequency communication network has a frequency in the range of 850-1000 mega-hertz, wherein the frequency continuously changes between a plurality of different preselected frequencies to thereby define frequency hopping, wherein the controller software of the host controller initiates polling of the plurality of communication nodes through the frequency hopping within the communications network, and wherein each of the plurality of communication nodes responds to the polling by the host computer through the frequency hopping within the communications network.

16. A system as defined in Claim 15, wherein the network software includes an autosequencer to initiate polling of the plurality of communication nodes whereby each of the plurality of communication nodes is individually attempted to be polled by the host computer to determine a strength of communication signal between the host computer and each of the plurality of communication nodes, wherein each of the plurality of communication nodes also attempt to communicate with each other responsive to the autosequencer to determine a strength of communication signal between one of the plurality of communications nodes and another one of the plurality of communication nodes, and wherein the autosequencer further determines a communication sequence to each of the plurality of communication nodes responsive to the strength of communication signal between the host computer and each of the plurality of communication nodes and responsive to the strength of communication signal between each of the plurality of communication nodes to define a preferred communication sequence path to each of the plurality of communication nodes from the host computer.

17. A system as defined in Claim 16, wherein the autosequencer updates the preferred communication sequence path to allow the preferred communication sequence path to vary over time.

18. A system as defined in Claim 17, wherein the plurality of meter data collectors include a first meter data collector, a second meter data collector in communication with the first meter data collector, and a third meter data collector in communication with at least one of the first and

second meter data collectors, wherein the first meter data collector is positioned remote from the host computer to thereby have a greater signal strength than the second meter data collector and the third meter data collector, wherein the second meter data collector is positioned remote from host computer to thereby have a greater signal strength than the third meter data collector, and wherein the network software further includes a raking router to collect meter usage data from the first meter data collector responsive to polling received from the host computer and to rakingly collect data from each of the second and third meter data collectors responsive to the polling so that meter usage data is collected from each of the first, second, and third meter data collectors responsive to polling the first meter data collector and routed to the host computer.

19. A system as defined in Claim 11, wherein at least one of the plurality of meter data collector is positioned within at least one of the following: the same housing as at least one of the plurality of utility meters, a separate housing positioned closely adjacent at least one of the plurality of utility meters, and a separate housing positioned closely adjacent a subset of the plurality of utility meters.

20. A system as defined in Claim 11, wherein the host computer further includes a memory having a meter data collector database associated therewith to thereby store meter collector data associated with each of the plurality of meter data collectors, the meter collector data including collector identification, collector physical address, and strength of signal between meter data collectors.

21. A meter data collector to interface with a utility meter, the meter data collector including:
a stationary housing adapted to be mounted adjacent a utility meter;
a sensor positioned to sense meter usage data from the utility meter;
a high power transceiver associated with the housing to transmit meter usage data from the meter data collector and to receive communication remote from the stationary housing in a medium to high range;
a collector controller positioned within the housing to control data communication to and from the high power transceiver and to control collecting of meter usage data from the sensor responsive to a remote command; and

a memory positioned within the stationary housing and associated with and in communication with the controller to store data therein, the memory including network software to communicate the meter usage data remotely through a communication network.

22. A meter data collector as defined in Claim 21, wherein the network software includes a preselected network data communication protocol, wherein the network data communication protocol includes a preselected application layer, and wherein the communication network comprises a radio frequency communication network.

23. A meter data collector as defined in Claim 22, wherein the radio frequency communication network has a frequency in the range of 850-1000 mega-hertz, wherein the frequency continuously changes between a plurality of different preselected frequencies to thereby define frequency hopping, wherein a remote host computer controller initiates polling of the meter data collector through the frequency hopping within the communications network, and wherein the collector controller responds to the polling by the host computer controller through the frequency hopping within the communications network.

24. A meter data collector as defined in Claim 23, wherein the network software includes an autosequencer to initiate respond to polling by the host computer controller and to initiate polling of at least one of a plurality of communication nodes whereby each of the plurality of communication nodes is individually attempted to be polled by the host computer to determine a strength of communication signal between the host computer and each of the plurality of communication nodes, and wherein each of the plurality of communication nodes also attempt to communicate with each other responsive to the autosequencer to determine a strength of communication signal between one of the plurality of communications nodes and another one of the plurality of communication nodes to thereby assist in determining a preferred communication sequence path to each of the plurality of communication nodes from the host computer.

25. A meter data collector as defined in Claim 24, wherein the autosequencer updates the preferred communication sequence path to allow the preferred communication sequence path to vary over time.

26. A method of collecting utility meter usage data, the method comprising:
- sensing meter usage data from each of a plurality of utility meters positioned remote from each other;
 - collecting utility usage data by each of a plurality of meter data collectors positioned adjacent each of the plurality of utility meters;
 - determining a preferred polling sequence route responsive to a strength of communication signal between a remote host computer and each of the plurality of meter data collectors;
 - polling each of the plurality of meter data collectors with the preferred polling sequence by the host computer positioned remote from the plurality of meter data collectors; and
 - transmitting meter usage data to the host computer from each of the plurality of meter data collectors along the preferred polling sequence route responsive to the polling by the host computer.
27. A method as defined in Claim 26, wherein the steps of polling and determining are periodically performed to update the preferred polling sequence route over time.
28. A method as defined in 27, wherein the plurality of meter data collectors include a first meter data collector, a second meter data collector in communication with the first meter data collector, and a third meter data collector in communication with at least one of the first and second meter data collectors, wherein the first meter data collector is positioned remote from the host computer to thereby have a greater signal strength than the second meter data collector and the third meter data collector, wherein the second meter data collector is positioned remote from host computer to thereby have a greater signal strength than the third meter data collector, and the method further comprising rakingly collecting data from each of the second and third meter data collectors responsive to the polling of the first meter data collector so that meter usage data is collected from each of the first, second, and third meter data collectors responsive to polling the first meter data collector and routing the rakingly collected meter usage data to the host computer.
29. A method as defined in Claim 27, wherein at least one of the plurality of meter data collector is positioned within at least one of the following: the same housing as at least one of the

plurality of utility meters, a separate housing positioned closely adjacent at least one of the plurality of utility meters, and a separate housing positioned closely adjacent a subset of the plurality of utility meters.

30. A method as defined in Claim 29, wherein the host computer includes a memory having a meter data collector database associated therewith to thereby store meter collector data associated with each of the plurality of meter data collectors, the meter collector data including collector identification, collector physical address, and strength of signal between meter data collectors.

31. A method of monitoring a utility meter mounted to a building, the method comprising:
mounting a meter data collector defining a remote collection unit adjacent a utility meter mounted to a building;
collecting meter data from the utility meter by the remote collection unit;
transmitting the meter data to a router of a communication network service provider;
transmitting the meter data through a communication network associated with the communication network service provider; and
receiving the meter data from the communication network by a computer device.

32. A method as defined in Claim 31, wherein the remote collection unit comprises a first remote collection unit, the utility meter comprises a first utility meter, and the building comprises a first building, and the method further comprises mounting a second remote collection unit adjacent a second utility meter mounted to second building, collecting meter data from the second utility meter by the second remote collection unit and transmitting the meter data from the second utility meter by the second remote collection unit, and transmitting the meter data of the second utility meter to the first remote collection unit, and wherein the meter data transmitted to the router comprises meter data from the first and second remote collection units.

33. A method of collecting utility meter data from a plurality of utility meters each mounted to a different building and each in communication with a respective one of a plurality of meter data collectors defining a plurality of remote collection units, the method comprising:

transmitting utility meter data from a first remote collection unit of the plurality of utility of remote collection units to a second remote collection unit of the plurality of collection units; and

transmitting utility meter data of the first remote collection unit and utility meter data of the second remote collection unit from the second remote collection unit to a host computer.

34. A method as defined in Claim 33, further comprising transmitting meter data from a third remote collection unit to the first remote collection unit and wherein the utility meter data of the first remote collection unit includes utility meter data from the third remote collection unit.

35. A method of collecting utility meter data, the method comprising:

positioning a meter data collector defining a remote collection unit having bi-directional RF data communication within a housing having a glass facing on at least one side thereof;

collecting utility meter data by the remote collection unit positioned adjacent the housing; polling the remote collection unit from a host computer by RF data communication through the glass facing; and

transmitting the collected utility meter data from the remote collection unit through the glass facing to the host computer responsive to the polling.

36. A method as defined in Claim 35, wherein the utility meter comprises a first utility meter of a plurality of utility meters, wherein the first utility meter comprises one of a gas utility meter, an electric utility meter, and a water meter, wherein a second of the plurality of utility meters comprises a different one of a gas utility meter, an electric utility meter, and a water utility meter, and wherein the step of collecting includes collecting utility meter data from both the first and second utility meters by the remote collection unit.

37. A method of collecting utility meter data, the method comprising:

positioning a plurality of meter data collectors defining a plurality of remote collection units adjacent to respective one of a plurality of utility meters, each of the plurality of utility meters being mounted to a different building;

polling each of the plurality of remote collection units from a collection computer positioned remote from the plurality of remote collection units; and

transmitting meter data from each of the plurality of remote collection units to the collection computer responsive to the polling.

38. A method as defined in Claim 37, wherein the collection computer comprises a field collection unit.

39. A method as defined in Claim 37, wherein the collection computer comprises a host computer.

40. A method as defined in Claim 38, further comprising a host computer positioned remote from and in communication with the field collection unit.

41. A method as defined in Claim 38, further comprising transmitting the utility meter data from the field collection unit to a router of a communication network service provider, communicating the utility meter data through a communication network associated with the communication network service provider, and receiving the utility meter data by a host computer in communication with the communication network.

42. A method as defined in Claim 38, wherein a first remote collection unit of the plurality of remote collection units transmits utility meter data to a second remote collection unit of the plurality of remote collection units, wherein the second remote collection unit transmits the utility meter data of the first and second remote collection units to a third remote collection unit of plurality of remote collection units, and wherein the third remote collection unit transmits utility meter data of the first, second, and third remote collection unit to the field collection unit.